

# Physics, Applied

College of Natural Science and Mathematics  
Department of Physics  
(907) 474-7339  
www.uaf.edu/physics/

## B.S. Degree

Minimum Requirements for Degree: 120 credits; 124 credits for concentration in Technical Management

The science of physics is concerned with the nature of matter and energy for all physical systems, from elementary particles to the structure and origin of the universe. Physics, together with mathematics and chemistry, provides the foundation for work in all fields of the physical sciences and engineering and contributes greatly to other fields such as the biosciences and medicine.

The field of applied physics encompasses those areas that have developed practical applications from fundamental research in physics in the last century, including space physics, plasma physics, condensed matter physics, device physics, surface physics, biophysics, laser physics and reactor physics.

The undergraduate curriculum provides a solid foundation in general physics. Students may study applied physics in one of three concentrations or may design a course of study appropriate for individual goals. Examples outside the approved concentrations could include engineering physics and biophysics. In all cases, the credits in applied physics (items “d” and “e” in each course outline) must be appropriate for the chosen subject area.

The concentration in Technical Management provides an opportunity to combine basic knowledge of physics with an aptitude for leadership in business. Declared physics majors in good standing with appropriate grades, department mentoring, and with approval for some courses are upon graduation welcome to apply to the M.B.A. program in UAF’s School of Management. GMAT exam required.

### Major—B.S. Degree with no concentration

1. Complete the general university requirements. (See page 116. As part of the core curriculum requirements, complete MATH 200X.)
2. Complete the B.S. degree requirements. (See page 121. As part of the B.S. degree requirements, complete MATH 201X, PHYS 211X\* and PHYS 212X\*.)
3. Complete the following program (major) requirements:
  - a. Complete the following:
    - MATH 202X—Calculus..... 4
    - PHYS 213X—Elementary Modern Physics\*..... 4
    - PHYS 220—Introduction to Computational Physics\* ..... 4
    - PHYS 301—Introduction to Mathematical Physics\*..... 4
    - PHYS 341—Classical Physics I: Particle Mechanics\*..... 4
    - PHYS 342—Classical Physics II: Electricity and Magnetism\* ..... 4
  - b. Complete mathematics credits at the 200-level or above .....9
  - c. Complete physics credits at the 300-level or above\* .....9
  - d. Complete credits in applied physics\* \*\* .....17
4. Minimum credits required .....120

**Concentrations: Atmospheric Physics, Computational Physics,**

## Technical Management

### Atmospheric Physics

1. Complete the general university requirements. (See page 116. As part of the core curriculum requirements, complete: MATH 200X.)
2. Complete the B.S. degree requirements. (See page 121. As part of the B.S. degree requirements, complete: MATH 201X, PHYS 211X\* and PHYS 212X\*.)
3. Complete the following program (major) requirements:
  - a. Complete the following:
    - MATH 202X—Calculus..... 4
    - PHYS 213X—Elementary Modern Physics\*..... 4
    - PHYS 220—Introduction to Computational Physics\* ..... 4
    - PHYS 301—Introduction to Mathematical Physics\*..... 4
    - PHYS 341—Classical Physics I: Particle Mechanics\*..... 4
    - PHYS 342—Classical Physics II: Electricity and Magnetism\* ..... 4
  - b. Complete mathematics credits at the 200-level or above .....9
  - c. Complete physics credits at the 300-level or above\* \*\* .....9
  - d. Complete the following: \*
    - ATM 401—Introduction to Atmospheric Science ..... 3
    - ATM 413—Atmospheric Radiation ..... 3
    - ATM 445—Atmospheric Dynamics..... 3
  - e. Complete credits in other relevant upper-division courses\* \*\* 8
4. Minimum credits required .....120

### Computational Physics

1. Complete the general university requirements. (See page 116. As part of the core curriculum requirements, complete MATH 200X.)
2. Complete the B.S. degree requirements. (See page 121. As part of the B.S. degree requirements, complete MATH 201X, PHYS 211X\* and PHYS 212X\*.)
3. Complete the following program (major) requirements:
  - a. Complete the following:
    - MATH 202X—Calculus..... 4
    - PHYS 213X—Elementary Modern Physics\*..... 4
    - PHYS 220—Introduction to Computational Physics\* ..... 4
    - PHYS 301—Introduction to Mathematical Physics\*..... 4
    - PHYS 341—Classical Physics I: Particle Mechanics\*..... 4
    - PHYS 342—Classical Physics II: Electricity and Magnetism\* ..... 4
  - b. Complete mathematics credits at the 200-level or above .....9
  - c. Complete credits in applied physics\* \*\* .....12
  - d. Complete the following in the concentration: \*
    - MATH 310—Numerical Analysis ..... 3
    - CS 201—Computer Science I..... 3
    - CS 202—Computer Science II ..... 3
  - e. Complete credits in other relevant upper-division courses\* \*\* .....5
4. Minimum credits required .....120

### Technical Management

1. Complete the general university requirements. (As part of the core curriculum requirements, complete MATH 200X.)
2. Complete the B.S. degree requirements. (As part of the B.S. degree requirements, complete MATH 201X, PHYS 211X\* and PHYS 212X\*.)
3. Complete the following program (major) requirements:
  - a. Complete the following:
    - MATH 202X—Calculus..... 4
    - PHYS 213X—Elementary Modern Physics\*..... 4
    - PHYS 220—Introduction to Computational Physics\* ..... 4
    - PHYS 301—Introduction to Mathematical Physics\*..... 4
    - PHYS 341—Classical Physics I: Particle Mechanics\*..... 4
    - PHYS 342—Classical Physics II: Electricity and Magnetism\* ..... 4

- b. Complete mathematics credits at the 200-level or above, which can include courses needed for the M.B.A. program, including: STAT 200X—Elementary Probability and Statistics or equivalent ..9
- c. Complete physics credits at the 300-level or above\*.....12
- d. Complete the following in the concentration, which can be prerequisites for entrance into the UAF School of Management's M.B.A. program\*\*\*\*.
- ACCT 261, 262—Accounting Concepts and Uses..... 6
- BA 325—Financial Management\*\*\* ..... 3
- BA 330—The Legal Environment of Business\*\*\* ..... 3
- BA 343—Principles of Marketing\*\*\* ..... 3
- BA 360—Operations Management\*\*\* ..... 3
- BA 390—Organizational Theory and Behavior\*\*\* ..... 3

4. Minimum credits required .....120
- \* Student must earn a C grade or better in each course.
- \*\*Note: These credits must be in a chosen subject area and approved before the beginning of the student's final semester by the head of the physics department.
- \*\*\* Prerequisites are MATH 202X, STAT 200X, PHYS 220 or permission of the M.B.A. director.
- \*\*\*\* Students can be required to earn a B grade or better if applying for the M.B.A. program.
- Note: Must exclude PHYS 103X and 104X from core curriculum natural science requirement.
- See General Science.

## Baccalaureate Core Requirements

All degrees (e.g. B.A., B.S., etc.) require additional courses. Refer to specific degree and program requirements.

### COMMUNICATION (9)

Complete the following:

ENGL 111X .....(3) \_\_\_\_\_  
*ENGL 190H may be substituted.*

Complete one of the following:

ENGL 211X OR ENGL 213X .....(3) \_\_\_\_\_

Complete one of the following:

COMM 131X OR COMM 141X.....(3) \_\_\_\_\_

### PERSPECTIVES ON THE HUMAN CONDITION (18)

Complete all of the following four courses:

ANTH 100X/SOC 100X.....(3) \_\_\_\_\_  
 ECON 100X OR PS 100X .....(3) \_\_\_\_\_  
 HIST 100X.....(3) \_\_\_\_\_  
 ENGL/FL 200X.....(3) \_\_\_\_\_

Complete one of the following three courses:

ART/MUS/THR 200X, HUM 201X OR ANS 202X ..... (3) \_\_\_\_\_

Complete one of the following six courses:

BA 323X, COMM 300X, JUST 300X, NRM 303X,  
 PS 300X OR PHIL 322X.....(3) \_\_\_\_\_

OR complete 12 credits from the above courses PLUS

- two semester-length courses in a single Alaska Native language or other non-English language OR
- three semester-length courses (9 credits) in American Sign Language taken at the university level.

### MATHEMATICS (3)

Complete one of the following:

MATH 103X, MATH 107X, MATH 161X OR STAT 200X.....(3-4) \_\_\_\_\_  
*\* No credit may be earned for more than one of MATH 107X or 161X.*

OR complete one of the following\*:

MATH 200X, MATH 201X, MATH 202X,  
 MATH 262X OR MATH 272X.....(4) \_\_\_\_\_  
*\*Or any math course having one of these as a prerequisite*

### NATURAL SCIENCES (8)

Complete any two (4-credit) courses:

ATM 101X .....(4) \_\_\_\_\_  
 BIOL 100X.....(4) \_\_\_\_\_  
 BIOL 103X.....(4) \_\_\_\_\_  
 BIOL 104X.....(4) \_\_\_\_\_  
 BIOL 105X.....(4) \_\_\_\_\_  
 BIOL 106X.....(4) \_\_\_\_\_  
 BIOL 111X.....(4) \_\_\_\_\_  
 BIOL 112X.....(4) \_\_\_\_\_  
 CHEM 100X.....(4) \_\_\_\_\_  
 CHEM 103X.....(4) \_\_\_\_\_  
 CHEM 104X.....(4) \_\_\_\_\_  
 CHEM 105X.....(4) \_\_\_\_\_  
 CHEM 106X.....(4) \_\_\_\_\_  
 GEOG 205X .....(4) \_\_\_\_\_  
 GEOS 100X.....(4) \_\_\_\_\_  
 GEOS 101X.....(4) \_\_\_\_\_  
 GEOS 112X .....(4) \_\_\_\_\_  
 GEOS 120X .....(4) \_\_\_\_\_  
 GEOS 125X .....(4) \_\_\_\_\_  
 MSL 111X.....(4) \_\_\_\_\_  
 PHYS 102X.....(4) \_\_\_\_\_  
 PHYS 103X.....(4) \_\_\_\_\_  
 PHYS 104X.....(4) \_\_\_\_\_  
 PHYS 115X.....(4) \_\_\_\_\_  
 PHYS 116X.....(4) \_\_\_\_\_  
 PHYS 175X.....(4) \_\_\_\_\_  
 PHYS 211X.....(4) \_\_\_\_\_  
 PHYS 212X.....(4) \_\_\_\_\_  
 PHYS 213X.....(4) \_\_\_\_\_

### LIBRARY AND INFORMATION RESEARCH (0-1)

Successful completion of library skills competency test OR  
 LS 100X or 101X prior to junior standing .....(0-1) \_\_\_\_\_

### UPPER-DIVISION WRITING AND ORAL COMMUNICATION (0)

Complete the following:

Two writing intensive courses designated (W) .....(0) \_\_\_\_\_  
 One oral communication intensive course designated (O) .....(0) \_\_\_\_\_  
 OR two oral communication intensive courses designated (O/2), at the upper-division level (see degree and/or major requirements).....(0) \_\_\_\_\_

TOTAL CREDITS REQUIRED.....38-39

